AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the

application:

LISTING OF CLAIMS:

1. (currently amended): A vehicular electronic control apparatus comprising a nonvolatile

program memory in which at least a control program suitable for a vehicle to be controlled is

stored, a nonvolatile data memory in which at least variable control data are stored, a RAM for

arithmetic processing, and a ~~microprocesser~~ microprocessor connected to the nonvolatile

program memory, the nonvolatile data memory and the RAM, for controlling vehicle electric

loads on the basis of input signals from vehicle sensors, the control program stored in the

nonvolatile program memory, and the variable control data stored in the nonvolatile data

memory,

the vehicular electronic control apparatus further comprising a reference data storage

memory, data memory abnormality ~~judgement~~ judgment means for the nonvolatile data memory,

and a first and second transfer means for the RAM,

wherein the reference data storage memory ~~is~~ comprises an electrically writable

nonvolatile memory in which reference data corresponding to the ~~variably~~ variable control data

stored in the nonvolatile data memory are stored,

the data memory abnormality judging means is constructed to judge whether the variable

control data stored in the nonvolatile data memory are normal or abnormal;

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the first transfer means ~~is~~ comprises means for transferring and writing the variable

control data from the nonvolatile data memory to the RAM if the data memory abnormality

judging means judges that the variable control data stored in the nonvolatile data memory are

normal,

the second transfer means ~~is~~ comprises means for writing estimated variable control data

based on the reference data from the reference data storage memory to the RAM if the data

memory abnormality judging means judges that the variable control data stored in the

nonvolatile data memory are abnormal, and

the microprocessor controls the vehicle electric loads on the basis of one of the variable

control data and the estimated variable control data that have been written to the RAM.

2. (currently amended): A vehicular electronic control apparatus comprising a

nonvolatile program memory in which at least a control program suitable for a vehicle to be

controlled is stored, a nonvolatile data memory in which at least variable control data are stored,

the nonvolatile data memory including first and second data memories in which at least parts of

the variable control data are stored in a duplicated manner, a RAM for arithmetic processing, and

a ~~microprocesser~~ microprocessor connected to the nonvolatile program memory, the nonvolatile

data memory and the RAM, for controlling vehicle electric loads on the basis of input signals

from vehicle sensors, the control program stored in the nonvolatile program memory, and the

variable control data stored in the nonvolatile data memory,

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the vehicular electronic control apparatus further comprising a reference data storage

memory, data memory abnormality judging means for the nonvolatile data memory, and first,

second and third transfer means for the RAM,

wherein the reference data storage memory is comprises an electrically writable

nonvolatile memory in which reference data corresponding to the parts of the variable control

data stored in the first and second data memories are stored,

the data memory abnormality judging means is comprises means for the first and second

data memories for judging whether the parts of the variable control data stored in the first data

memory and those stored in the second data memory are normal or abnormal,

the first transfer means is comprises means for transferring and writing the parts of the

variable control data from one of the first and second data memories to the RAM if the data

memory abnormality judging means judges that the parts of the variable control data stored in

the first data memory and those stored in the second data memory are both normal,

the second transfer means is comprises means for writing estimated variable control data

based on the reference data from the reference data storage memory to the RAM if the data

memory abnormality judging means judges that the parts of the variable control data stored in

the first data memory and those stored in the second data memory are both abnormal,

the third transfer means is comprises means for transferring and writing, if the data

memory abnormality judging means judges that one of the parts of the variable control data

stored in the first data memory and those stored in the second data memory is abnormal, the parts

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of the variable control data stored in a normal one of the first and second data memories to the

RAM, and

the microprocessor controls the vehicle electric loads on the basis of one of the variable

control data and the estimated variable control data that have been written to the RAM.

3. (currently amended): The vehicular electronic control apparatus according to claim 1

or 2, wherein the nonvolatile program memory and the reference data storage memory are

comprise nonvolatile flash memories and the nonvolatile data memory is comprises a nonvolatile

EEPROM.

4. (currently amended): The vehicular electronic control apparatus according to claim 1

or 2, wherein the nonvolatile program memory is comprises a nonvolatile flash memory, and the

first and second data memories and the reference data storage memory are nonvolatile

EEPROMs.

5. (original): The vehicular electronic control apparatus according to claim 1 or 2,

wherein the reference data include upper and lower limit value data of the variable control data

stored in the nonvolatile data memory, and the estimated variable control data are average values

of the upper and lower limit value data.

6. (original): The vehicular electronic control apparatus according to claim 1 or 2,

wherein the reference data include typical values of the variable control data stored in the

nonvolatile data memory and allowable range data relating to allowable variation ranges for the

typical values, and the estimated control variable data are the typical values.

7. (currently amended): The vehicular electronic control apparatus according to claim 1 or 2,

wherein:

the variable control data stored in the nonvolatile data memory include learning ~~storage~~

data and at least one of control-apparatus-specific data and vehicle-specific data;

the control-apparatus-specific data are calibration value data to be used for correcting for

variations of parts constituting the vehicular electronic control apparatus and are control

constants that do not vary once stored as initial values;

the vehicle-specific data include at least one of vehicle type data to be used for selecting

and determining a control specification of the vehicle to be controlled and environment data of

the vehicle sensors that are externally connected to the vehicular electronic control apparatus,

and are control constants that do not vary once stored as initial values;

the learning data include at least one of drive control data obtained by actually measuring

drive characteristics of the vehicle to be controlled and variation data relating to characteristic

deteriorations of the vehicle sensors and the vehicle electric loads, and are variable control data

that are expected to vary in prescribed ranges after being stored as initial values at a start of a

drive; and

the reference data stored in the reference data storage memory are reference data

corresponding to the learning data and the at least one of the control-apparatus-specific data and

the vehicle-specific data, and each of the reference data includes one of an upper and lower value

data and a typical value and allowable variation range data of the typical value.

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8. (original): The vehicular electronic control apparatus according to claim 1 or 2,

wherein the data memory abnormality judging means includes bit information lack and

erroneous mixing detecting means for the nonvolatile data memory and range comparing means

for judging whether the variable control data stored in the nonvolatile data memory fall within

allowable ranges of the reference data stored in the reference data storage memory by comparing

the variable control data with the reference data, and the bit information lack and erroneous

mixing detecting means and the range comparing means judge whether the variable control data

stored in the nonvolatile data memory are normal or abnormal.

9. (original): The vehicular electronic control apparatus according to claim 8, wherein the

bit information lack and erroneous mixing detecting means performs one of a sumcheck and a

parity check.

10. (original): The vehicular electronic control apparatus according to claim 1, further

comprising saving processing means and RAM abnormality judging means for the RAM,

wherein the saving processing means is data storing means for transferring, at a

prescribed period or at prescribed time points, the variable control data in the RAM that are

rewritten by the microprocessor to the data memory so as to overwrite the data stored therein;

the RAM abnormality judging means includes at least one of bit information lack and

erroneous mixing detecting means for the RAM, coincidence judging means for judging whether

variable control data that have not been rewritten among the variable control data that have been

transferred and written from the nonvolatile data memory to the RAM by the first transfer means

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with the variable control data that are already stored in the nonvolatile data memory, and range

comparing means for comparison with the reference data, and

the data memory abnormality judging means makes a judgment if the RAM abnormality

judging means judges that the data that have been written to the RAM are abnormal, and one of

the first and second transfer means performs transfer and writing on the RAM depending on a

result of the judgment.

11. (currently amended): The vehicular electronic control apparatus according to claim 1

or 10, further comprising abnormality alarming and display means responsive to the data

memory abnormality judging means,

wherein the abnormality alarming and display means is comprises means for announcing

notifying that the microprocessor is controlling the vehicle electric loads using the estimated

variable control data that have been written to the RAM from the reference data storage memory

by the second transfer means.

12. (currently amended): The vehicular electronic control apparatus according to claim

10, further comprising abnormality history storing means, saving processing means, and delayed

power shutoff means,

wherein the abnormality history storing means is comprises a means for storing, in itself,

a fact of occurrence of an abnormality in at least one of the nonvolatile data memory, the RAM,

the nonvolatile program memory, and the reference data storage memory and a content of the

abnormality, and for storing the fact and the content in the RAM,

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the saving processing means is~~comprises~~ means for transferring the fact of occurrence of

the abnormality and the content of the abnormality that have been stored in the RAM by the

abnormality history storing means to the data memory together with the variable control data;

and

the delayed power shutoff means is~~comprises~~ a power circuit for shutting off control

power with a delay that is not shorter than a time from opening of a power switch to completion

of saving processing by the saving processing means.

13. (original): The vehicular electronic control apparatus according to claim 2, further

comprising saving processing means and RAM abnormality judging means for the RAM,

wherein the saving processing means is data storing means for transferring, at a

prescribed period or at prescribed time points, the variable control data in the RAM that are

rewritten by the microprocessor to the nonvolatile data memory so as to overwrite the data stored

therein; and

the RAM abnormality judging means includes at least one of bit information lack and

erroneous mixing detecting means for the RAM, coincidence judging means for judging whether

the variable control data ~~that have not been rewritten among the corresponding variable control~~

~~data~~ that have been transferred and written to the RAM by one of the first and third transfer

means with the parts of the variable control data that have been written to the first data memory

and those that have been written to the second data memory, and range comparing means for

comparison with each of the reference data, and

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the data memory abnormality judging means makes a judgment on the first and second

data memories if the RAM abnormality judging means judges that the variable control data that

have been written to the RAM are abnormal, and one of the first, second and third transfer means

performs transfer and writing on the RAM depending on a result of the judgment.

14. (currently amended): The vehicular electronic control apparatus according to claim 2

or 13, further comprising mutual transfer means,

wherein the mutual transfer means is-comprises means for transferring and writing , if

one of the first and second data memories is abnormal, the variable control data stored in a

normal one of the first and second data memories to an abnormal one, and

the third transfer means transfers and writes the variable control data from one of the first

and second data memories to the RAM-like the first transfer means does so.

15. (currently amended): The vehicular electronic control apparatus according to claim 2,

further comprising abnormality alarming and display means responsive to the data memory

abnormality judging means,

wherein the abnormality alarming and display means announces-notifies that the

microprocessor is controlling the vehicle electric loads using at least one of the estimated

variable control data that have been written to the RAM by the second transfer means and the

variable control data that have been transferred and written to the RAM by the third transfer

means.

16. (currently amended): The vehicular electronic control apparatus according to

claim 13, further comprising abnormality history storing means, saving processing means and

delayed power shutoff means,

wherein the abnormality history storing means is comprises means for storing, in itself, a

fact of occurrence of an abnormality in at least one of the first and second data memories, the

RAM, the nonvolatile program memory, and the reference data storage memory and a content of

the abnormality, and for storing the fact and the content in the RAM;

the saving processing means is comprises means for transferring the content of the

abnormality that has been stored in the RAM by the abnormality history storing means to the

first and second data memories together with the variable control data; and

the delayed power shutoff means is a power circuit for shutting off control power with a

delay that is not shorter than a time from opening of a power switch to completion of saving

processing by the saving processing means.

17. (currently amended): The vehicular electronic control apparatus according to claim 1

or 2, further comprising system abnormality judging means, abnormality operation storing means

and drive stopping means,

wherein the system abnormality judging means includes bit information lack and

erroneous mixing detecting means for the nonvolatile program memory and the reference data

storage memory to thereby judge whether the system is normal or abnormal,

the abnormality operation storing means is an abnormality operation storing circuit for storing a fact that the system abnormality judging means produced a judgment result of abnormality, the abnormality operation storing circuit being reset when a power switch is closed, and

the drive stopping means is a logic circuit for stopping a load power relay from supplying drive power to at least part of the vehicle electric loads when the abnormality operation storing circuit ~~is storing~~ stores the fact of occurrence of the abnormality.

18. (original): The vehicular electronic control apparatus according to claim 17, further comprising a watchdog timer,

wherein the watchdog timer is a timer circuit for generating a reset signal for temporarily resetting the microprocessor and then reactivating the microprocessor if a watchdog signal generated by the microprocessor has an abnormal pulse width, and

the abnormality storing means performs an abnormality storing operation also in response to the reset signal generated by the timer circuit.

19. (currently amended): The vehicular electronic control apparatus according to claim 1 or 2, further comprising system abnormality judging means, resetting means counting means and drive stopping means,

wherein the system abnormality judging means includes bit information lack and erroneous mixing detecting means for the nonvolatile program memory and the reference data storage memory to thereby judge whether the system is normal or abnormal,

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the resetting means is comprises means for temporarily resetting the microprocessor and

then reactivating the microprocessor if the system abnormality judging means produces a

judgment result to the effect that the system is abnormal,

the counting means is comprises a counter circuit for generating a count when the number

of times of resetting of the microprocessor by the resetting means has exceeded a prescribed

value, the counter circuit being reset when a power switch is closed; and

the drive stopping means is comprises a logic circuit for stopping a load power relay from

supplying drive power to at least part of the vehicle electric loads when the counter circuit is

generating the generates said count.

20. (original): The vehicular electronic control apparatus according to claim 19, further

comprising a watchdog timer,

wherein the watchdog timer is a timer circuit for generating a reset signal for temporarily

resetting the microprocessor and then reactivating the microprocessor if a watchdog signal

generated by the microprocessor has an abnormal pulse width, wherein the counting means

performs an abnormality counting operation also in response to the reset signal generated by the

timer circuit.